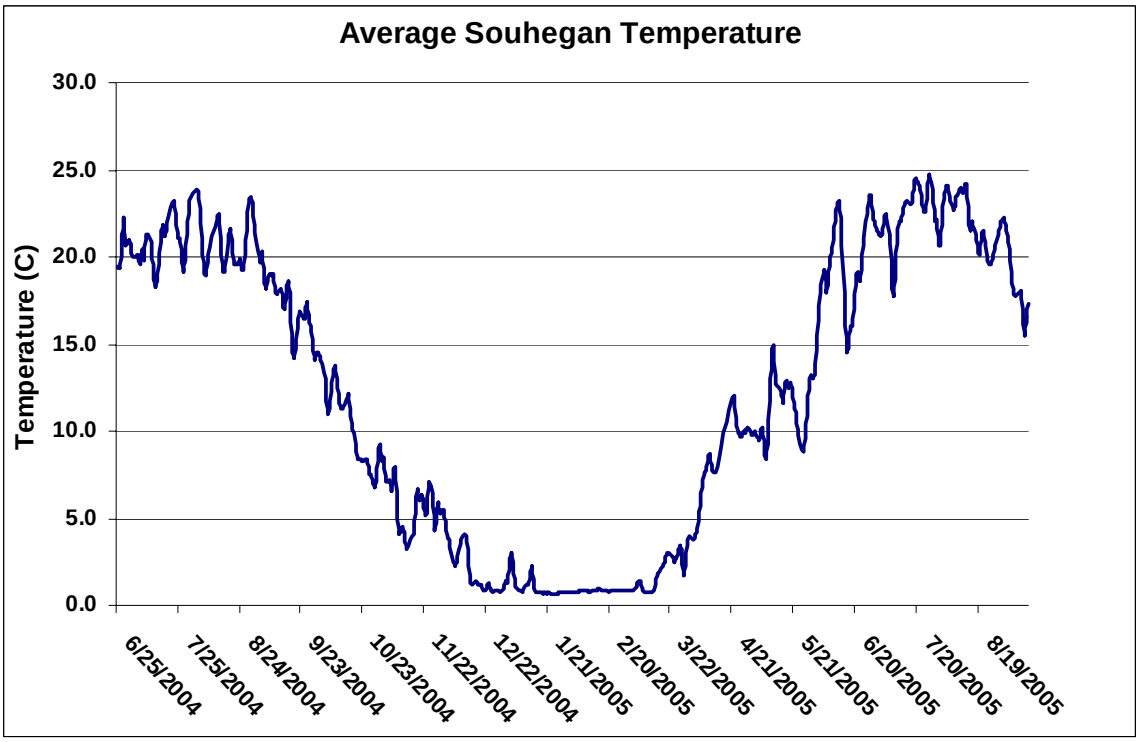
Appendix 5

Temperature Conditions

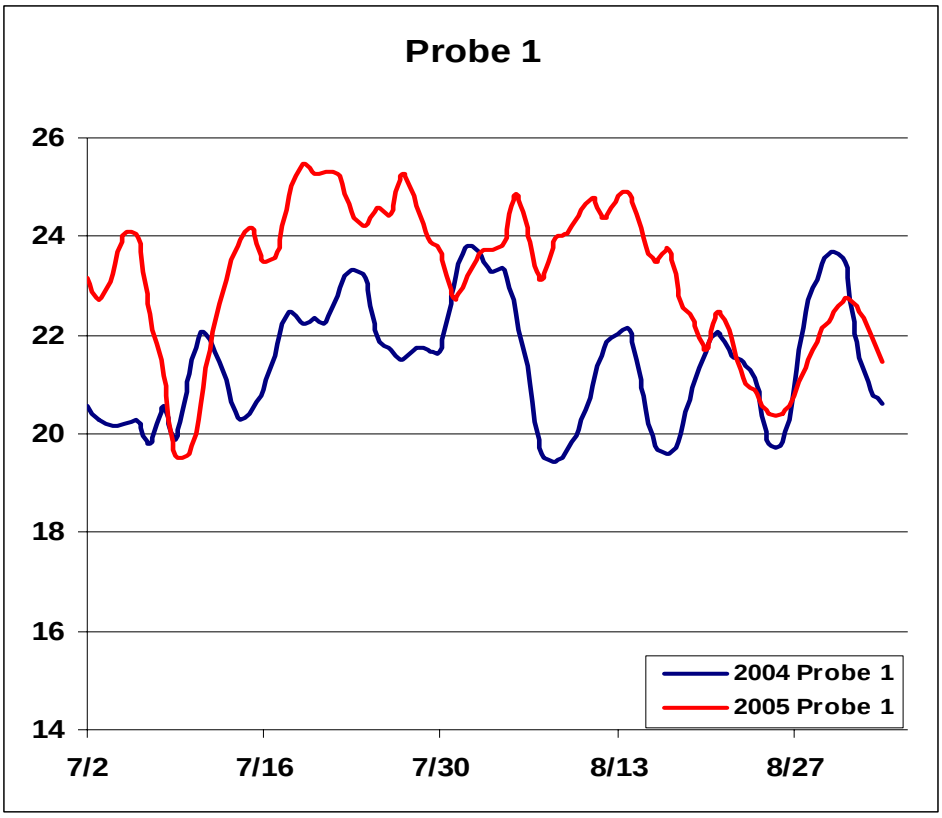
Ten Hobo® temperature probes (Onset computer corporation, Bourne, MA) were installed throughout a 52 km study area starting from the New Ipswich, NH impoundment and ending at the Merrimack River confluence. Data recovered from these probes form the basis of our study period (June 26, 2004 – September 13, 2005). Average daily temperature data was calculated for each probe and then averaged with other probes collecting data on that day. The number of probes collecting data on any given day varies at times because of the loss of several probes in the spring ice-melt and flood events. Figure 1 presents a river average temperature for the Souhegan River during the study period.

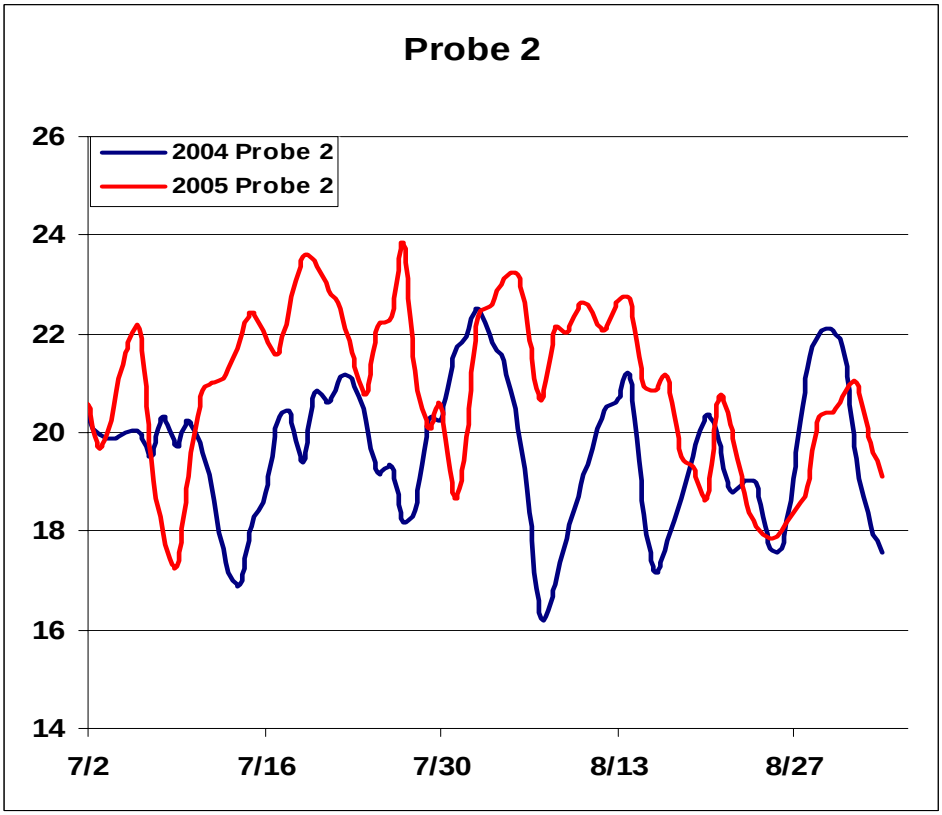
Figure 1: Summary of average Souhegan River temperature data from all available probes during the period of study.

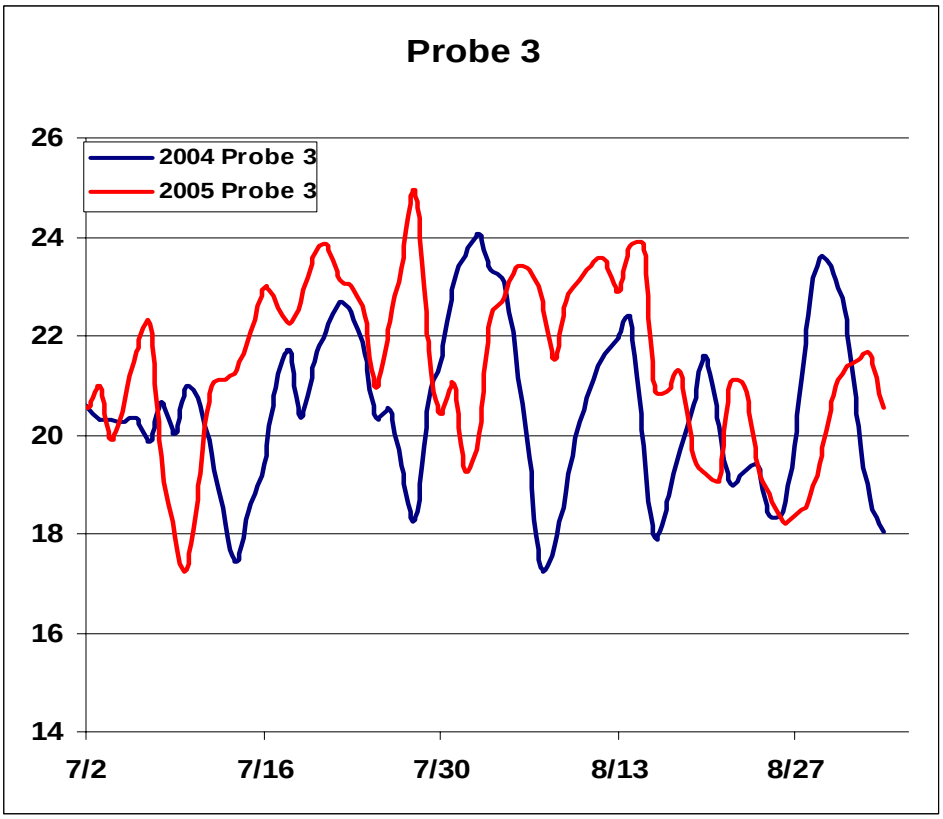


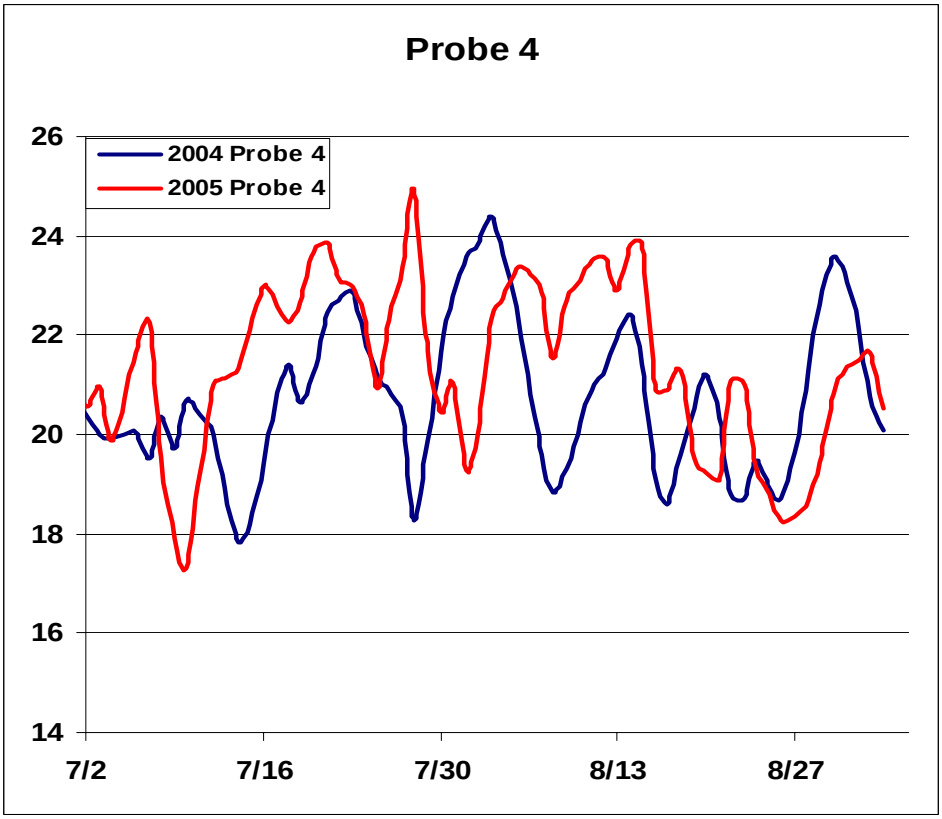
Individual probe graphs (Figure 2) show the common days for the period of record's summer seasons. Each graph covers the period from July 2 to September 3 for 2004 (plotted in blue) and 2005 (plotted in red). Daily average water temperatures for the 2005 season were on average two degrees warmer than in 2004. All probes were located in the same location each year for the study period's duration. However, Probe 6 became buried with sediment in the middle of July and subsequently recorded groundwater temperature, seeping from the steep bank under which it was located.

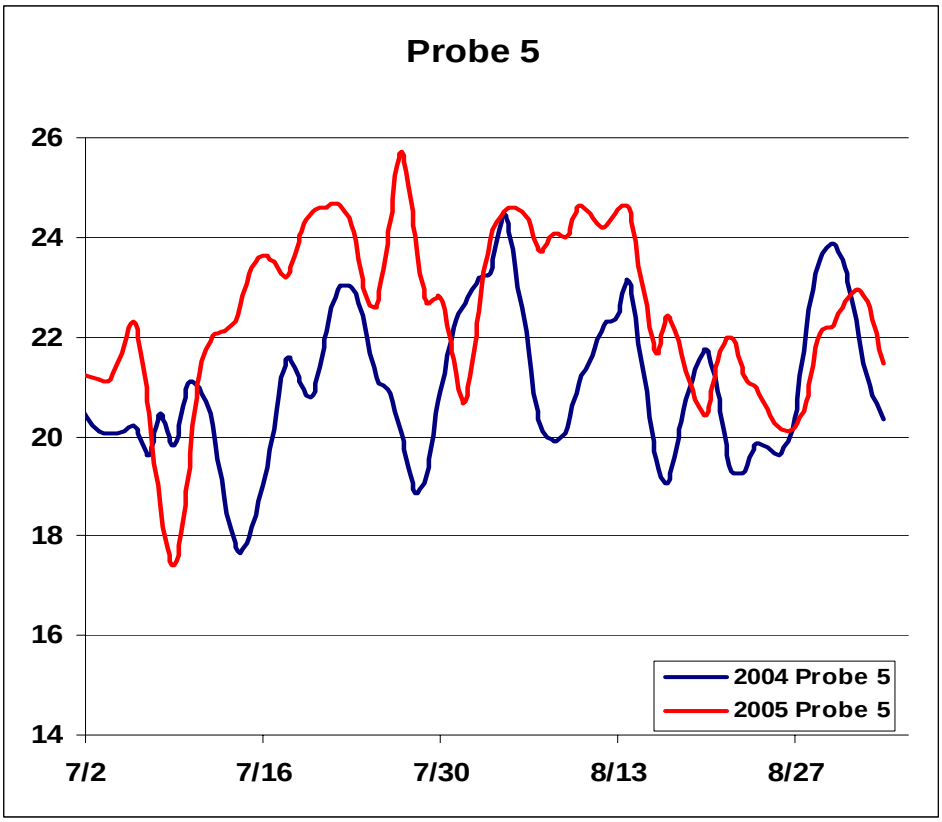
Figure 2: Comparison of 2004 (blue) and 2005 (red) temperature data for the period of common days between the two summer seasons for each probe on the Souhegan River. In general, the 2005 summer season was 2° C warmer than the 2004 season.

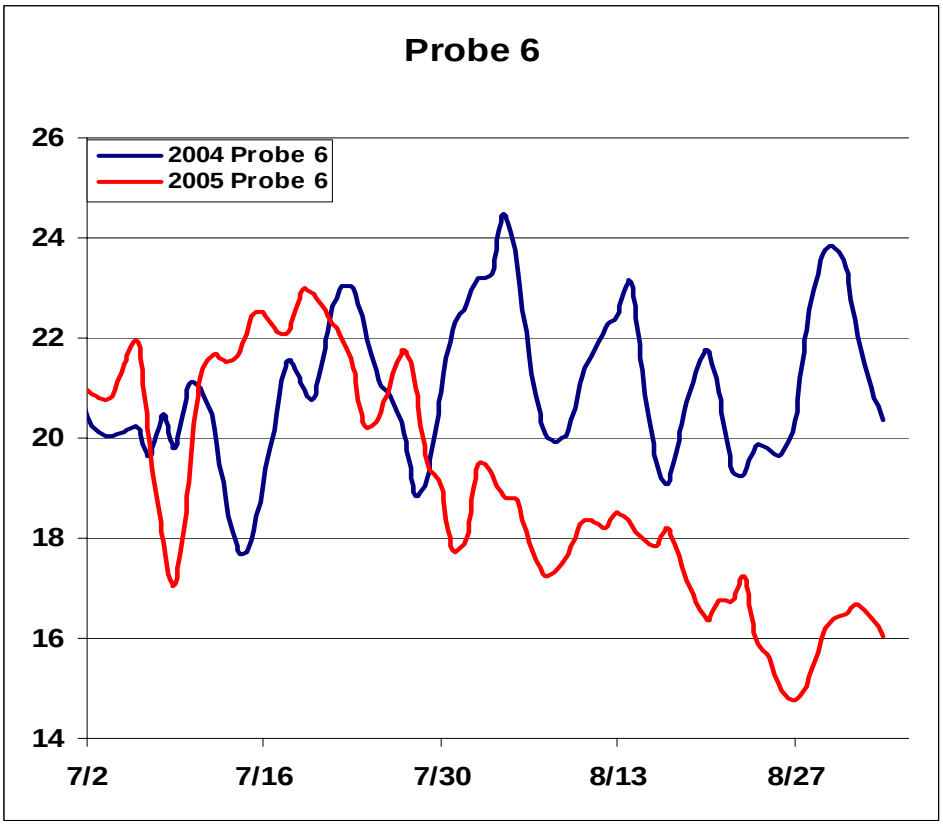

Probe 1
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27
2004 Probe 1
2005 Probe 1

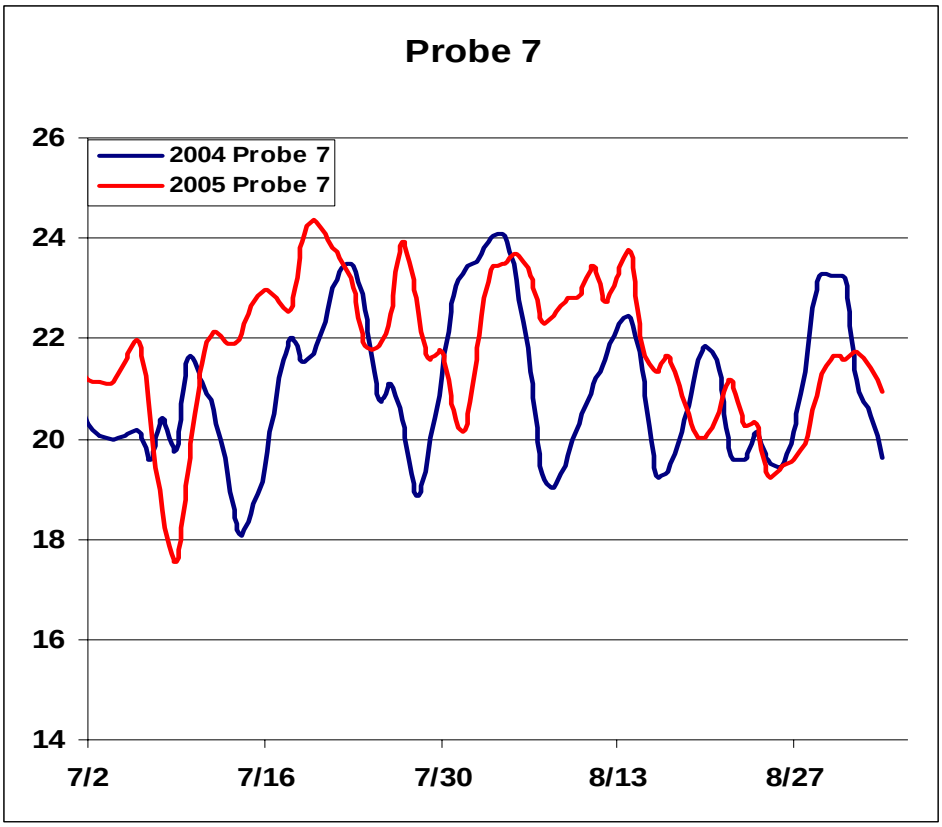

Probe 2
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27
2004 Probe 2
2005 Probe 2

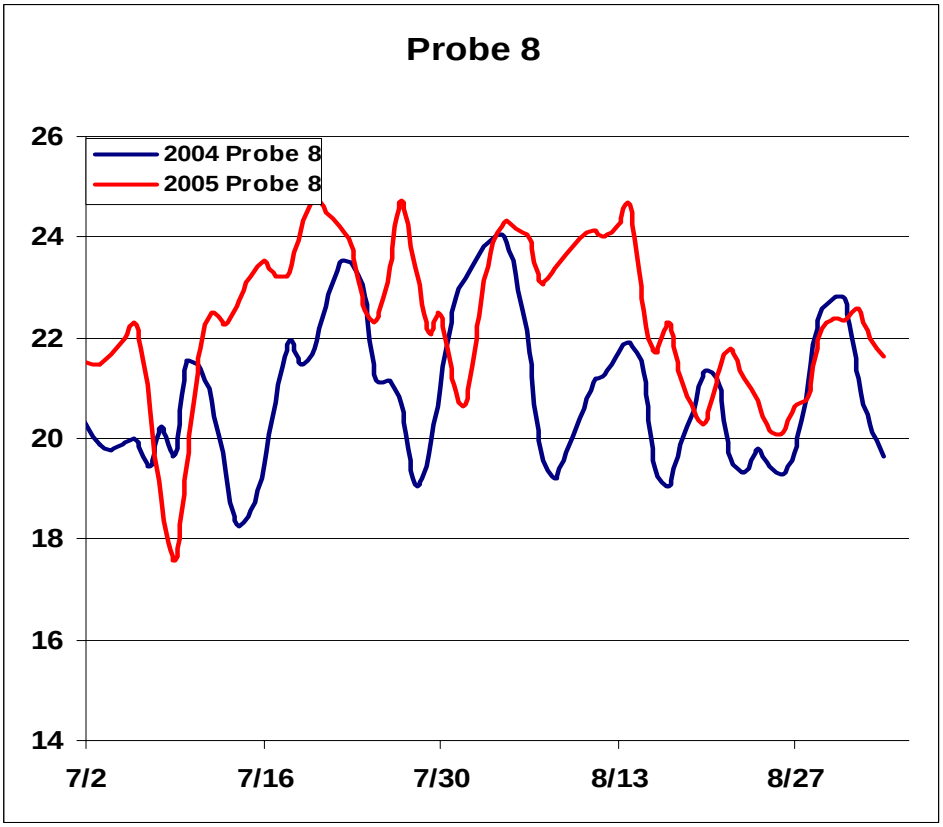

Probe 3
2004 Probe 3
2005 Probe 3
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27

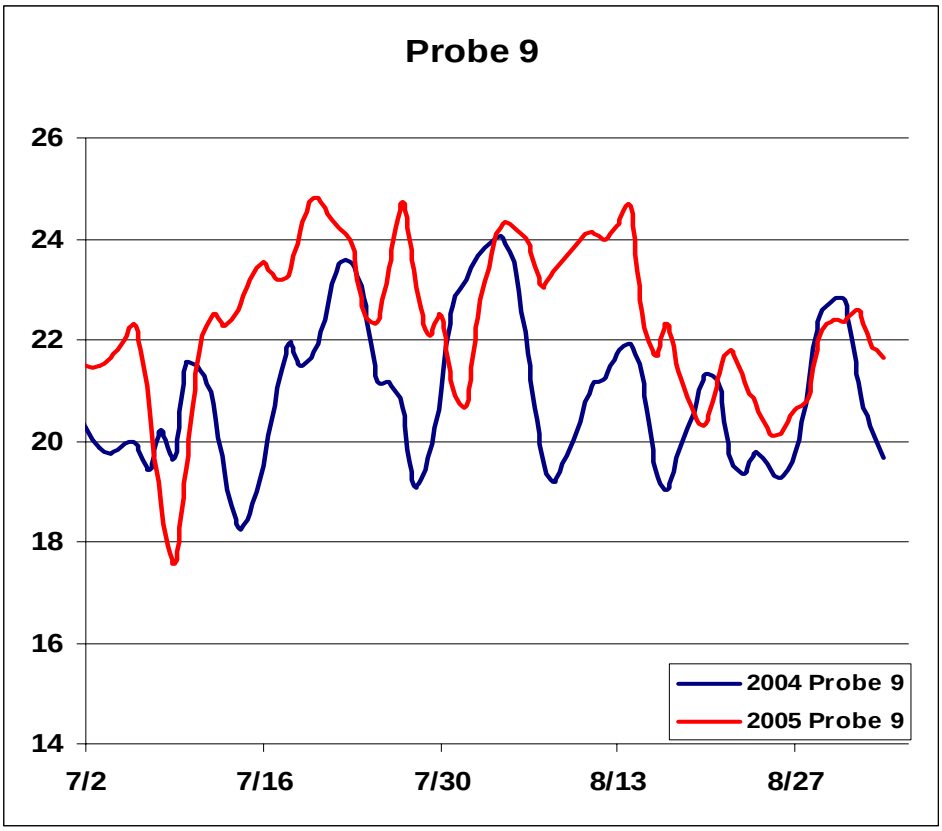

Probe 4
2004 Probe 4
2005 Probe 4
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27

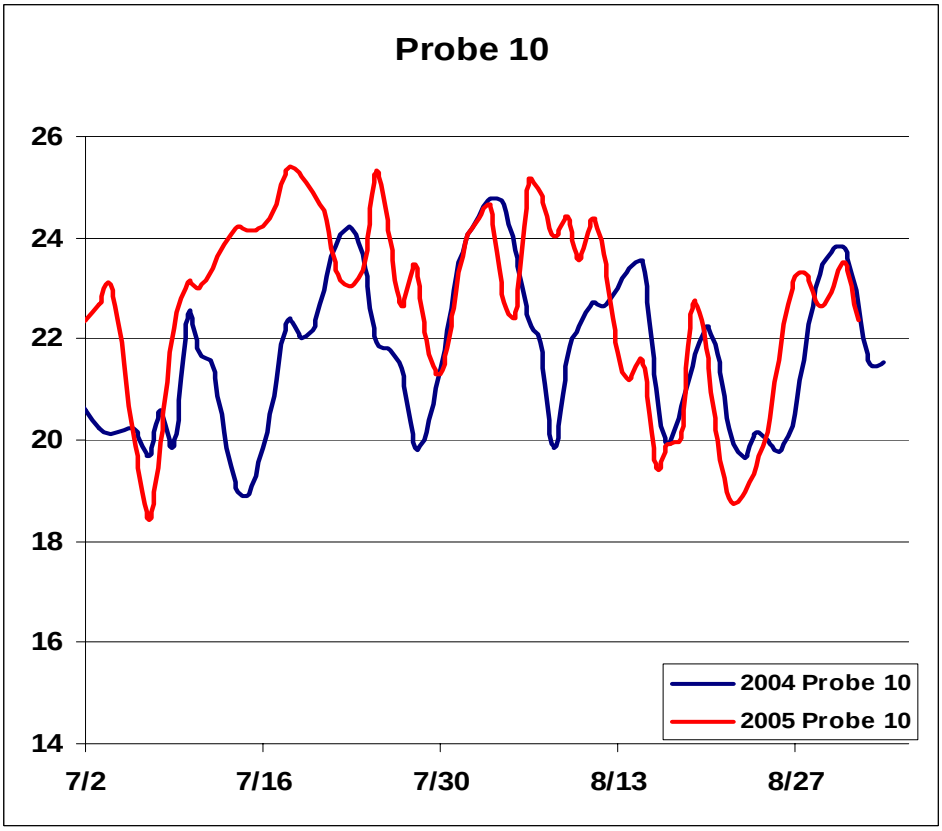

Probe 5
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27
2004 Probe 5
2005 Probe 5


Probe 6
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27
2004 Probe 6
2005 Probe 6


Probe 7
2004 Probe 7
2005 Probe 7
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27

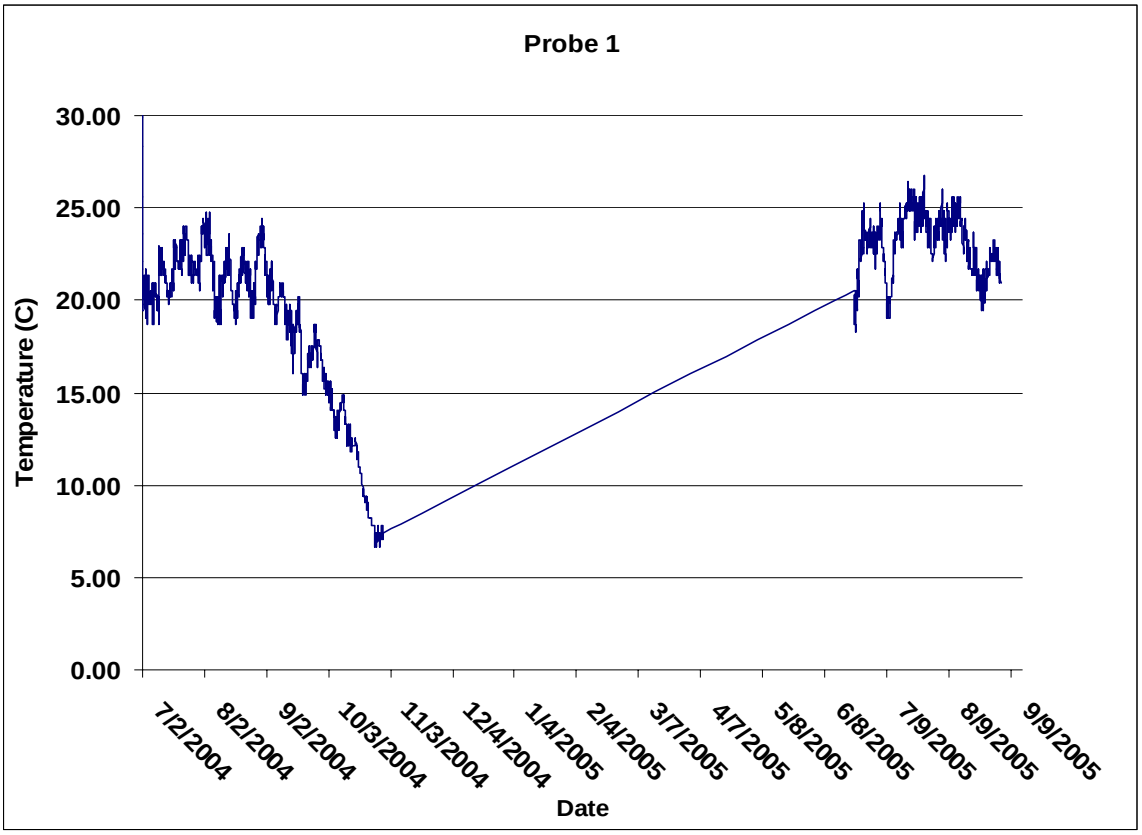

Probe 8
2004 Probe 8
2005 Probe 8
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27

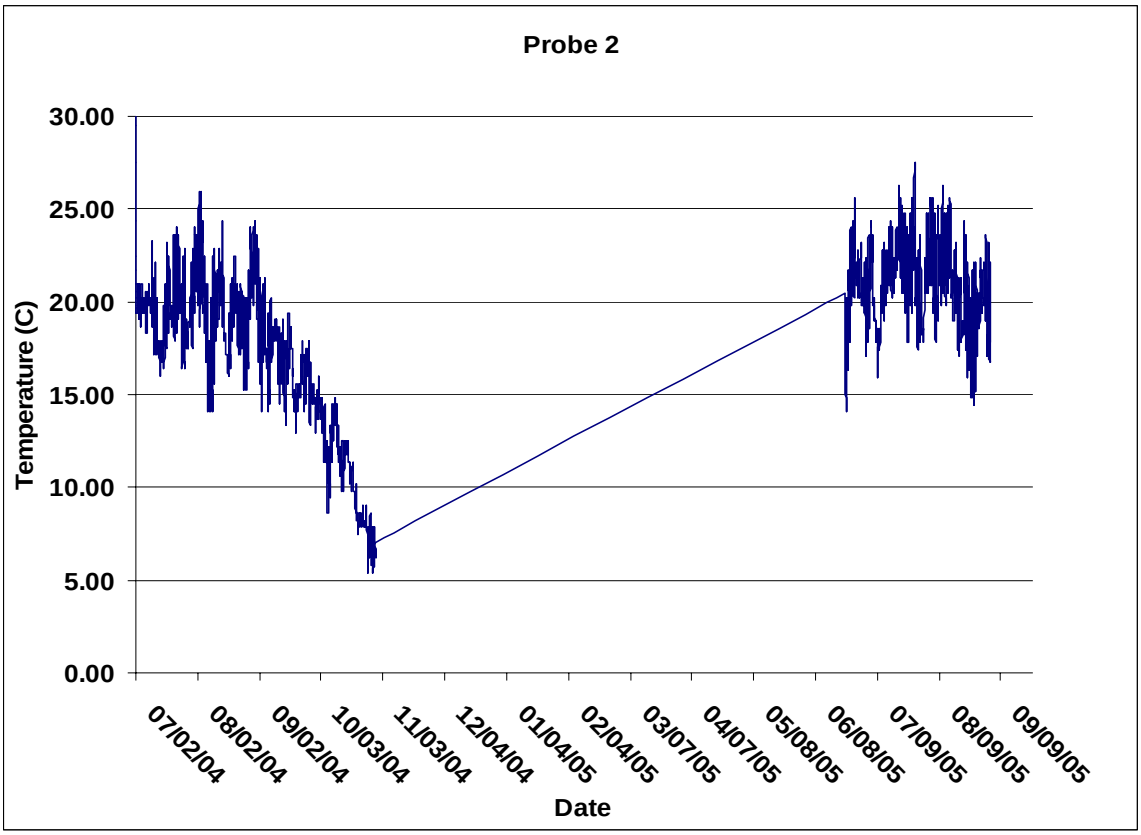

Probe 9
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27
2004 Probe 9
2005 Probe 9

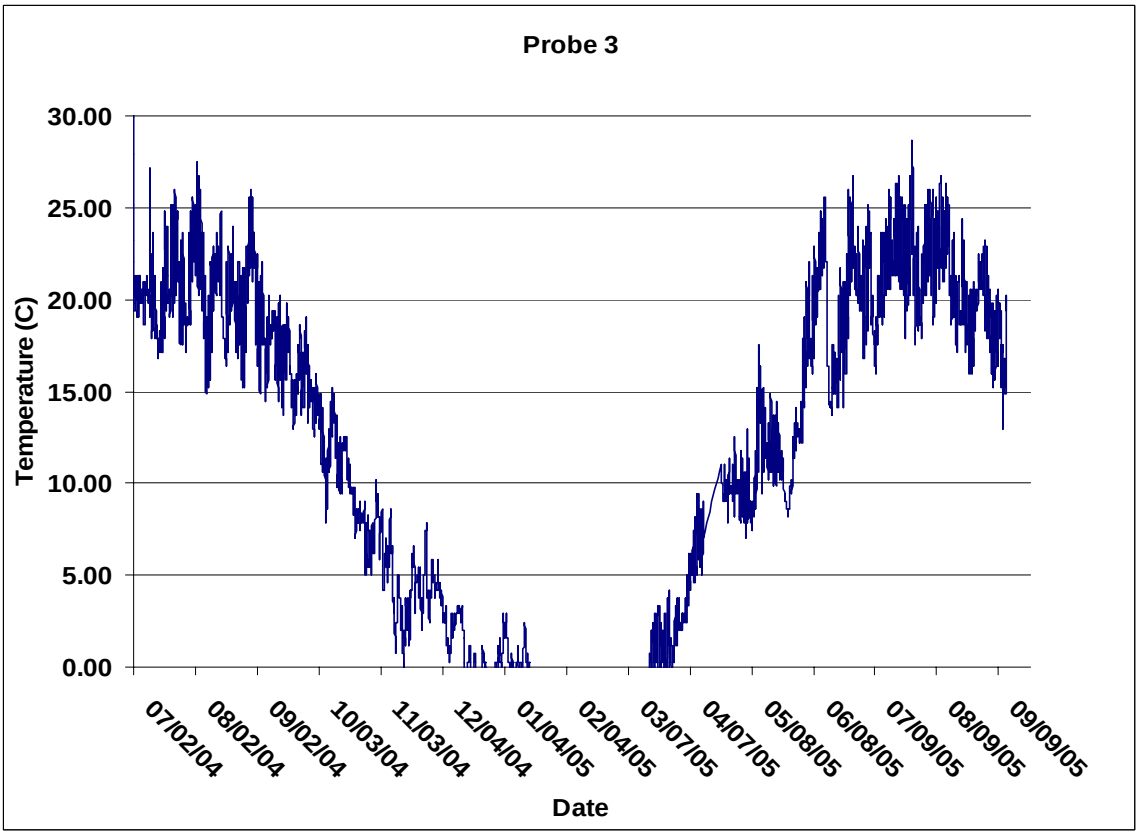

Probe 10
26
24
22
20
18
16
14
7/2
7/16
7/30
8/13
8/27
2004 Probe 10
2005 Probe 10

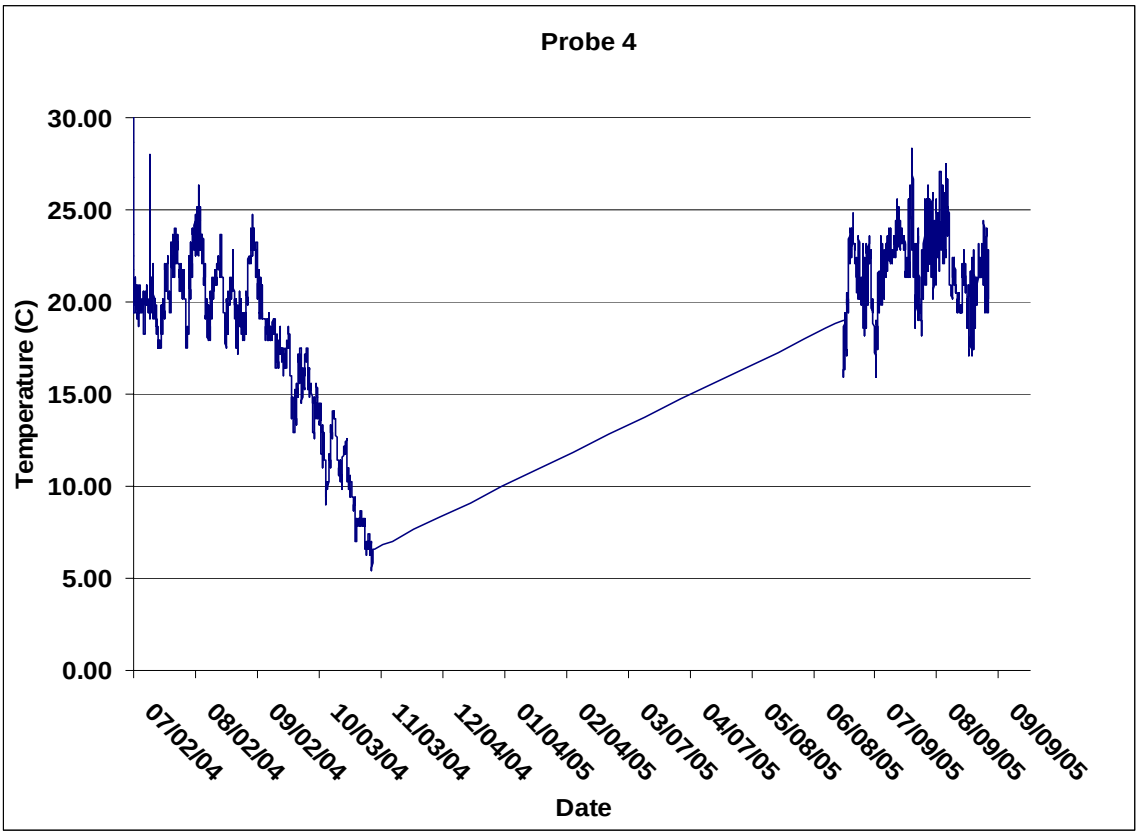
The graphs below (Figure 3) show raw data obtained for each of the ten long-term temperature probes installed in the study section of the Souhegan River. Temperatures were recorded hourly at each site. Gaps in some probe data records during the winter season are due to lost instruments or dead batteries and are represented by straight lines between the two summer season records. Temperatures recorded in the headwaters (upstream of the study area) during the end of the 2005 season are also included below.

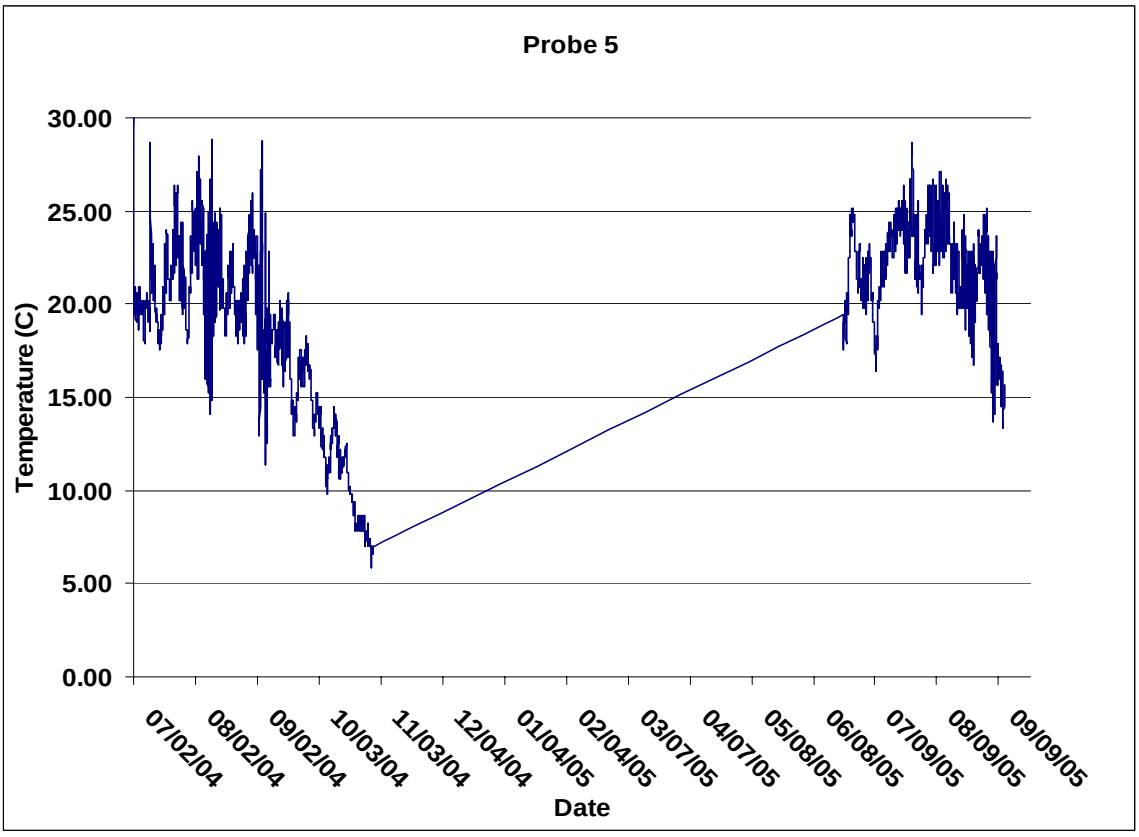
Figure 3: Raw temperature data for each temperature probe in the Souhegan River recovered during the study period.

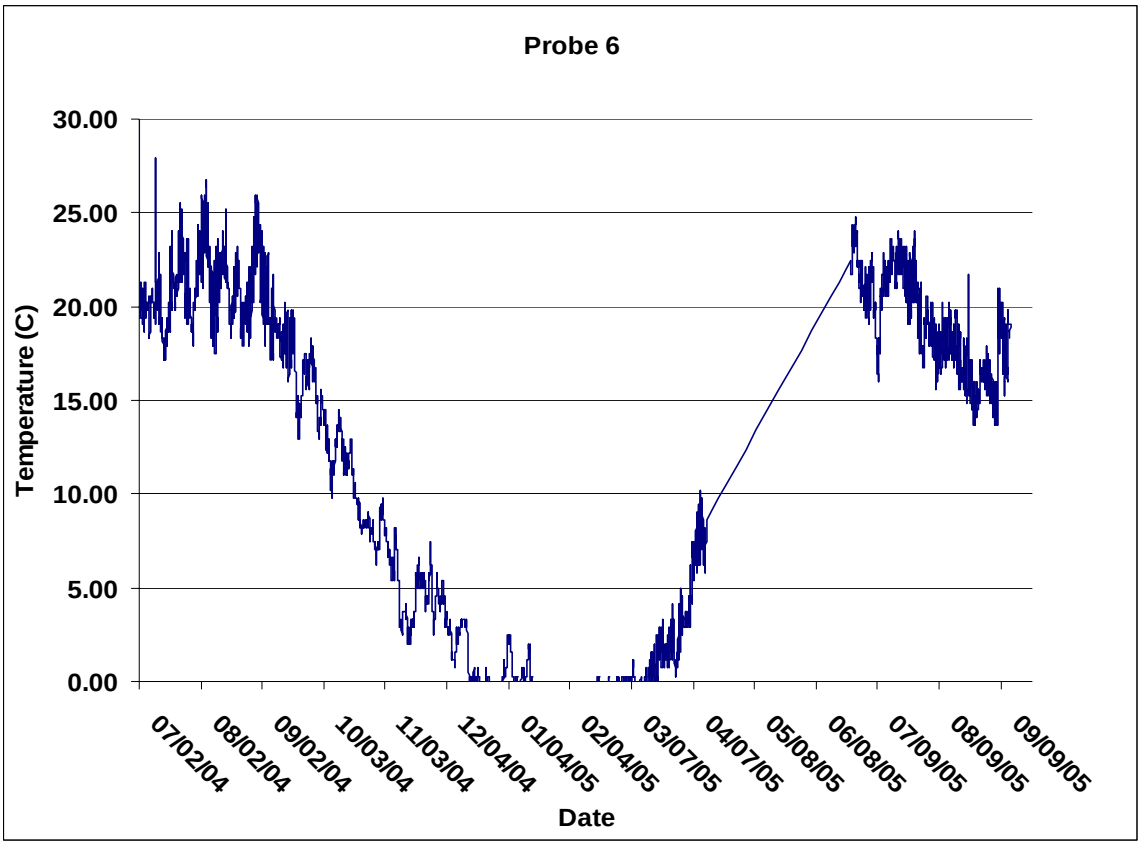


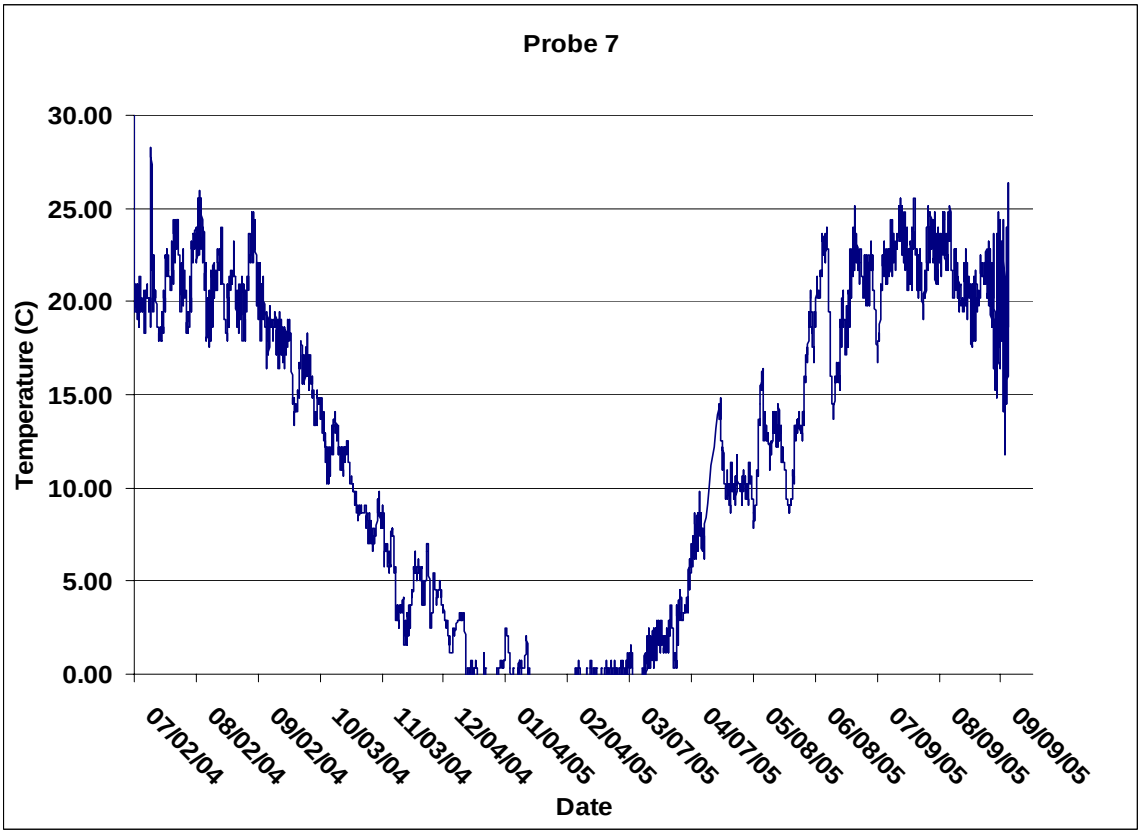

Probe 2
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date

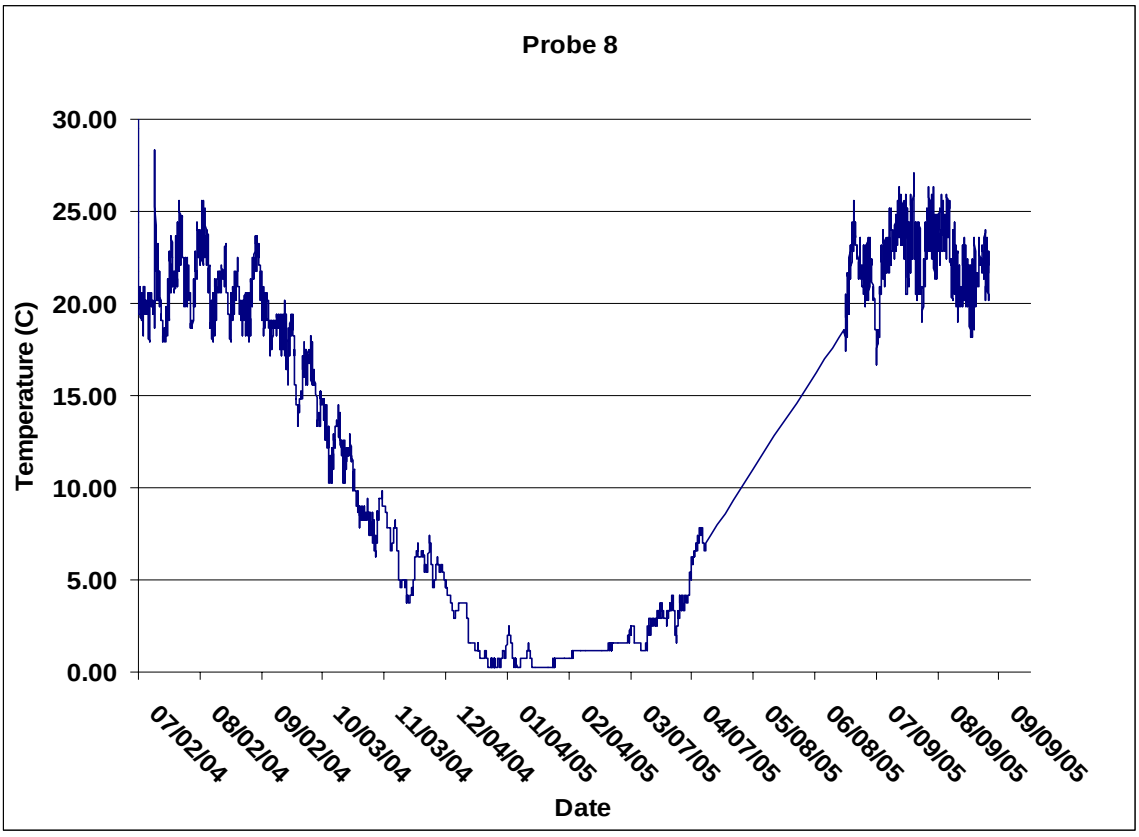

Probe 3
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date

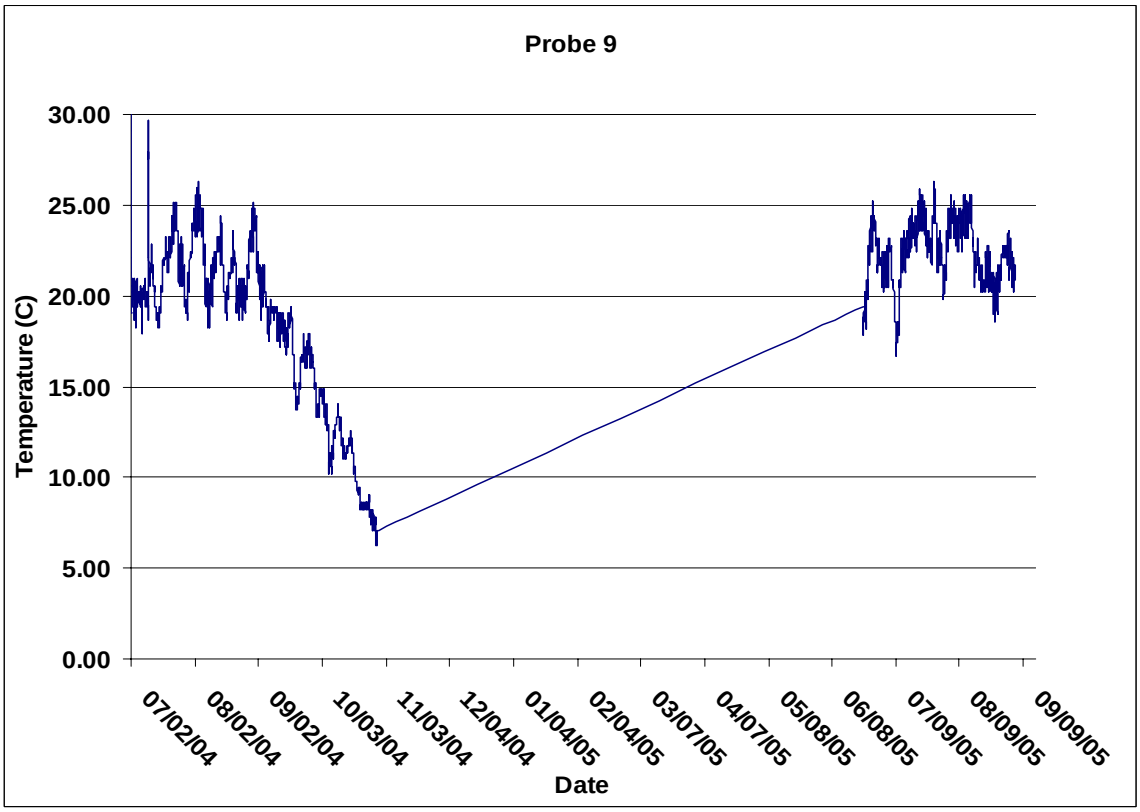

Probe 4
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date

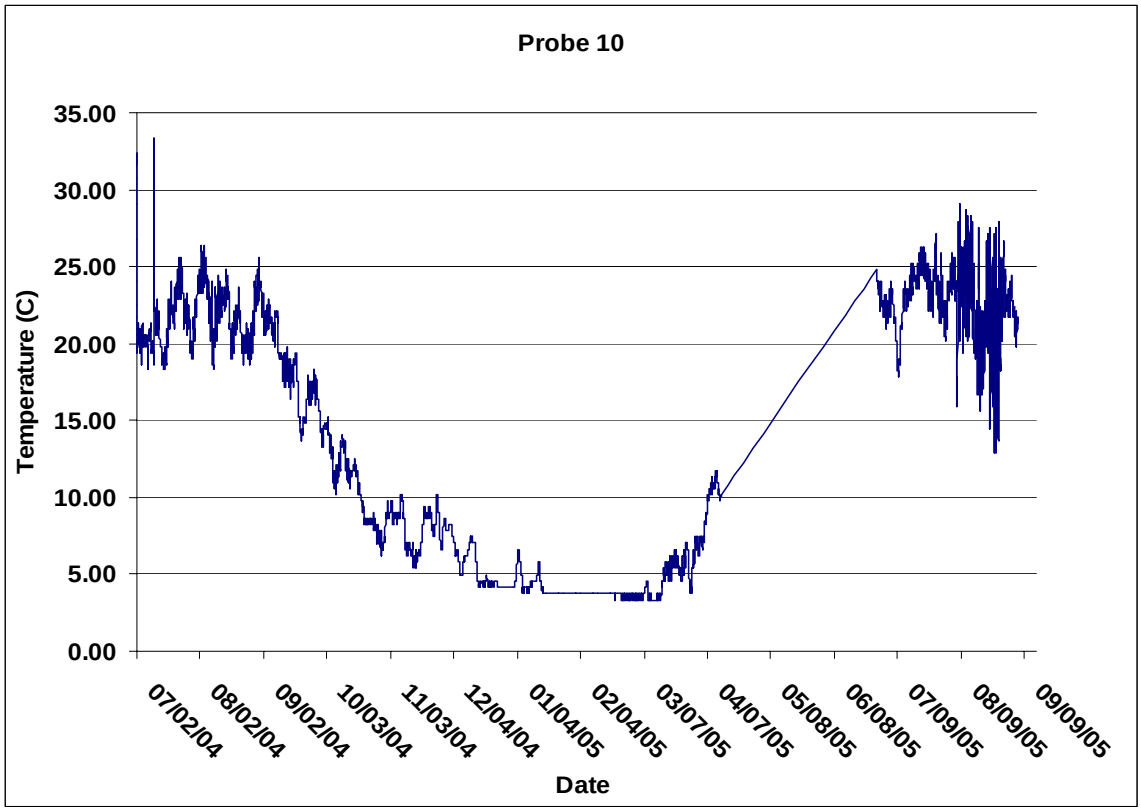

Probe 5
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date

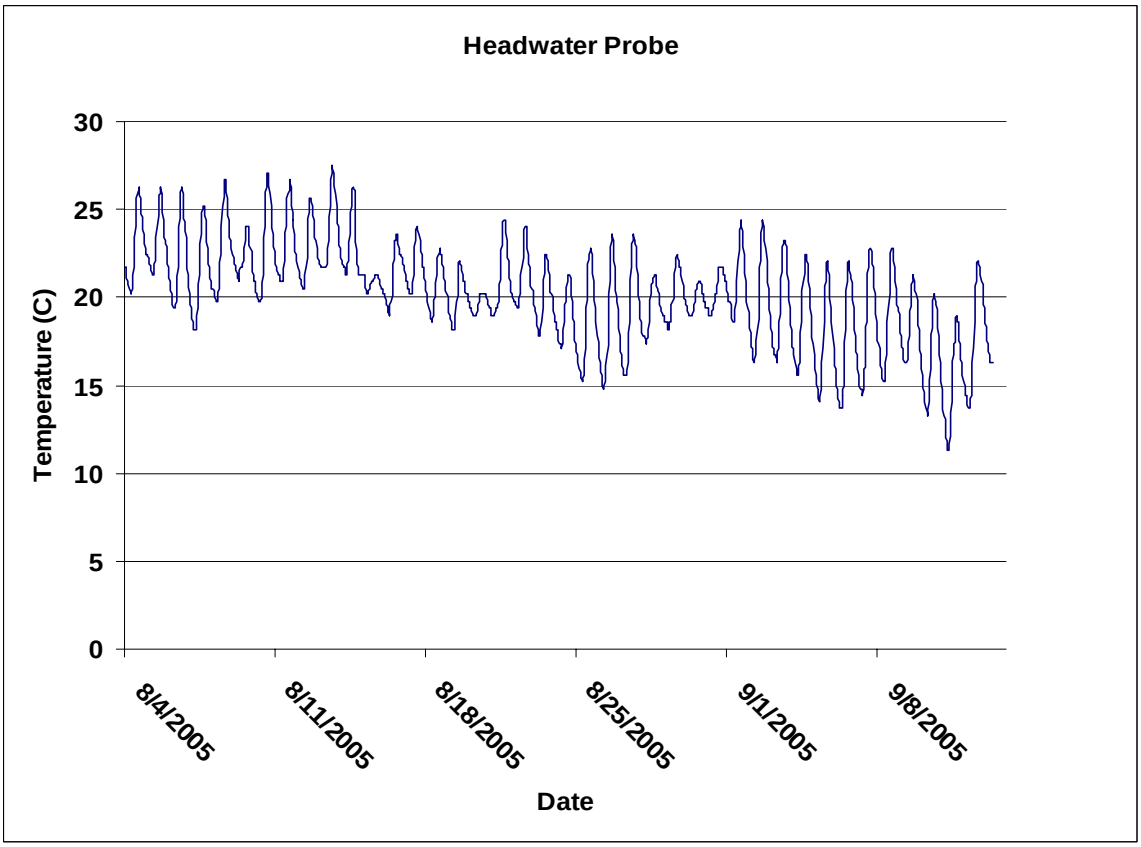

Probe 6
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date


Probe 7
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date


Probe 8
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date


Probe 9
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date


Probe 10
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Temperature (C)
07/02/04
08/02/04
09/02/04
10/03/04
11/03/04
12/04/04
01/04/05
02/04/05
03/07/05
04/07/05
05/08/05
06/08/05
07/09/05
08/09/05
09/09/05
Date


Headwater Probe
30
25
20
15
10
5
0
Temperature (C)
8/4/2005
8/11/2005
8/18/2005
8/25/2005
9/1/2005
9/8/2005
Date